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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/810,454	03/19/2001	Eiji Hayashi	50088-056	7197

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McDERMOTT, WILL & EMERY
600 13th Street, N.W.
Washington, DC 20005-3096

EXAMINER

JOHNSON, JONATHAN J

ART UNIT	PAPER NUMBER
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1725

DATE MAILED: 01/28/2003

10

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/810,454	HAYASHI	
	Examiner	Art Unit	
	Jonathan Johnson	1725	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 December 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Taizo (JP 11-097493) in view of Ulmer (6,138,894). Taizo teaches applying a vacuum to the end of a semiconductor element through an ultrasonic bonding head to fixedly attach the semiconductor element to the ultrasonic bonding head (Figure 1, item 14, 5, and 2); applying a pressure to gold bumps to connect the pad of a semiconductor element or a connecting pad of the wiring board for connecting the bumps under a state that the bumps are in contact while the ultrasonic bonding head is moved in a plurality of directions (Translation sections 14-17 and Figure 2, Items a and b). Ulmer teaches heating solder bumps minimally sufficient to melt the solder at a temperature "about the melting temperature of the solder." (Column 2, Lines 40-45; Column 4, Lines 34-35 and Figure 3, Item 50). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the process of Taizo to utilize a heater to heat the solder bumps to more than the fusing point of the solder in order to ensure the die is bonded to the substrate and to shorten the manufacturing time (see Ulmer Column 4, lines 35-41).

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Taizo (JP 11-097493) and Ulmer (6,138,894) as applied to claim 1 above and further in view of Kuriyama (5,315,474). Kuriyama teaches an inactive atmosphere or a reducing atmosphere is formed during bonding (Column 5, Lines 15-45). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combined invention of Ulmer et al. and Tazio to utilize the particular gas in order to prevent oxidation of the bonding surfaces.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Taizo (JP 11-097493) in view of Ulmer (6,138,894) and Uno (JP 6-29357). Taizo teaches applying a vacuum to the end of a semiconductor element through an ultrasonic bonding head to fixedly attach the semiconductor element to the ultrasonic bonding head (Figure 1, item 14, 5, and 2); applying a pressure to gold bumps to connect the pad of a semiconductor element or a connecting pad of the wiring board for connecting the bumps under a state that the bumps are in contact while the ultrasonic bonding head is moved in a plurality of directions (Translation sections 14-17 and Figure 2, Items a and b). Ulmer teaches heating solder bumps minimally sufficient to melt the solder at a temperature "about the melting temperature of the solder." (Column 2, Lines 40-45; Column 4, Lines 34-35 and Figure 3, Item 50). Uno teaches ultrasonic bonding by moving the head along a circular locus (abstract). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the process of Taizo to utilize a heater to heat the solder bumps to more than the fusing point of the solder in order to ensure the die is bonded to the substrate and to shorten the manufacturing time (see Ulmer Column 4, lines 35-41) and

further to modify the combined invention of Taizo and Ulmer to utilize moving the head along a circular locus in order to shorten the metal bonding time (see Uno abstract).

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Taizo (JP 11-097493) in view of Ulmer (6,138,894). Taizo teaches applying a vacuum to the end of a semiconductor element through an ultrasonic bonding head to fixedly attach the semiconductor element to the ultrasonic bonding head (Figure 1, item 14, 5, and 2); applying a pressure to gold bumps to connect the pad of a semiconductor element or a connecting pad of the wiring board for connecting the bumps under a state that the bumps are in contact while the ultrasonic bonding head is moved in a plurality of directions (Translation sections 14-17 and Figure 2, Items a and b). Ulmer teaches heating solder bumps minimally sufficient to melt the solder at a temperature "about the melting temperature of the solder" wherein no flux is supplied to the bumps (Column 2, Lines 40-45; Column 4, Lines 30-40; Column 5, Lines 1-15 and Figure 3, Item 50). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the process of Taizo to utilize a heater to heat the solder bumps to more than the fusing point of the solder without the use of flux in order to ensure the die is bonded to the substrate and to shorten the manufacturing time (see Ulmer Column 4, lines 35-41).

Response to Arguments

Applicant again argues Ulmer does not teach the claim limitation of "heat[ing the solder bump] to a temperature more than the fusing point of the solder." The examiner disagrees. Although applicant is correct in pointing out Ulmer teaches "locally heating the substrate to a temperature minimally sufficient to melt the solder" (see Ulmer Column 2, Lines 43-45), the

examiner would like to point out that Ulmer also teaches heating the solder to a temperature sufficient enough to "melt[] the solder." (see Ulmer Column 4, Lines 30-40).

Applicant next argues that Ulmer teaches away from heating the solder bumps to a temperature more than the fusing point of the solder. Applicant argues that because Ulmer teaches "minimiz[ing] the temperature of the substrate," one would not have been motivated to heat the solder bumps to more than the fusing point of the solder. (see Ulmer Column 4, Lines 41-42). The examiner disagrees. The examiner recognizes that it is improper to combine references where the references teach away from their combination. *In re Grasselli*, 713 F.2d 731, 743, 218 USPQ 769, 779 (Fed. Cir.1983) (The claimed catalyst which contained both iron and an alkali metal was not suggested by the combination of a reference which taught the interchangeability of antimony and alkali metal with the same beneficial result, combined with a reference expressly excluding antimony from, and adding iron to, a catalyst.) In the instant case, Ulmer is completely silent as to expressly excluding the heating of the solder bumps to a temperature more than the fusing point of the solder. In fact, Ulmer teaches heating the solder to a temperature "about the melting point of the solder," which suggests that Ulmer's process allows for a temperature higher than the melting point of the solder (Column 4, lines 34-35).

A prior art reference must be considered in its entirety. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984). First, Ulmer suggested "minimiz[ing] the temperature of the substrate" in order to prevent damage to the chip (which, as Ulmer describes, is in the range of 300 to 400 C). (see Ulmer Column 1, Lines 50-56). Second, Ulmer specifically uses a low melting point solder (63/37 solder) in order to avoid damage to the chip as 63/37 solder has a melting point of 188 C, which

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is 112-212 C less than the temperature at which a chip becomes damaged (Column 1, Lines 55-56 and Column 4, Lin40-41). When applying the rule of W.L. Gore & Associates by considering the reference in its entirety, Ulmer does not teach away from heating the solder bump to a temperature more than the fusing point of the solder; but rather Ulmer teaches using a solder that has a low melting point in order to minimize the temperature of the chip because the an increase in chip temperature increases the likelihood of damage to the chip.


Conclusion


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Johnson whose telephone number is 703-308-0667.

The examiner can normally be reached on M-Th 7AM-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Dunn can be reached on 703-308-3318. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

jj 
January 15, 2003


M. J. ELVE
PRINCIPAL EXAMINER